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P.O. BOX 3001  
BRIARCLIFF MANOR, NY 10510

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 09/854,119  
Filing Date: May 11, 2001  
Appellant(s): TRAJKOVIC, MIROSLAV

**MAILED**

**APR 18 2005**

**Technology Center 2600**

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James D. Leimbach  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed October 28, 2004.

**(I) *Real Party in Interest***

A statement identifying the real party in interest is contained in the brief.

**(II) *Related Appeals and Interferences***

A statement identifying the related appeals and interferences, which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

**(III) *Status of Claims***

The statement of the status of the claims contained in the brief is correct.

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(IV) *Status of the Amendments After Final***

The statement of the status of the claims contained in the brief is correct.

**(V) *Summary of the claimed Subject Matter***

The summary of invention contained in the brief is correct.

**(VI) *Ground of rejection to be reviewed on appeal***

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1-20 rejected under 35 U.S.C. (a) as being obvious over U.S. Patent No. 5,848,121 issued in the name of Gupta et al. in view of U.S. Patent No. 5,651,075 issued in the name of Frazier et al.

**(VII) Response to Argument**

Appellant on page 6 second paragraph argues that Gupta et al. do not teach the determining a first alignment approximation, based on distances between one or more points in the first image and the second image.

*Examiner's reply: Appellant uses the claim language of "a first image" and "a second image" which are theoretically similar to Guptas' invention language used as "a mask image" and as "a opacified image" respectively. Also Appellant uses the claim language of "a first alignment approximation" and "a second alignment approximation", which are theoretically similar to Guptas' invention language used as "a lowest resolution" and "a highest resolution" respectively. Gupta et al. in col. 3, lines 44-62 teaches clearly the limitations of the Appellant claim language. Gupta discloses in the mentioned col. only the interesting points in the mask image are matched with their corresponding points in the opacified image, at step 58 see fig. 2. In order to match a point in the mask image to its corresponding point in the opacified image, and in one embodiment, a small tile of imagery around the point in the mask image is correlated with all tiles in the opacified image. This process proceeds hierarchically from the lowest resolution to the highest resolution. The center of the tile in the opacified image that gives the maximum correlation is identified as the corresponding match point.*

Appellant on the same page and paragraph argues that Gupta et al. do not teach the determining a second alignment approximation that is based on the distances between one or more points in the first image and the initially aligned second image.

*Examiner's reply: This is similar as a previous argument.*

Art Unit: 2672

*Appellant* on the same page and paragraph argues that Gupta et al. do not teach aligning image based on the combination of a first alignment approximation with a second alignment approximation.

*Examiner's reply:* As Examiner pointed out from previous rejection that Gupta et al. do not explicitly specify the language of "a combination of the first and second alignment". Gupta is silent in respect to the claim language that Appellant uses as "a combination ...". However, Gupta in the abstract teaches for obtaining sub-pixel registration of mask and opacified digital X-ray images includes the steps of match point generation, locally-adaptive image-to-image warp generation, and log subtraction, for generating a DSA image. Examiner assumption: Gupta is generating a (digital subtraction anangiography) DSA image by combining the opacified and mask images.

Appellant on page 6 lines 21-34 argues that Frazier et al. do not discuss or suggest or aligning or manipulating multiple images.

*Examiner's reply:* Frazier et al. in figs. 4(a-c) clearly illustrate the combination of image of license plate in fig. 4a with the higher resolution of the same image in fig. 4b resulted in fig. 4c that is considered as a highest resolution. Frazier et al. are detecting the region of interest (ROI) by locating the object then analyzing the content of the captured images (objects).

Appellant on page 7, line 1 argues that Frazier et al. do not disclose alignments based on different resolutions.

*Examiner's reply:* Frazier et al. in figs. 4(a-c) illustrate explicitly alignment base on different resolutions.

Art Unit: 2672

Appellant on pages 7-8 argues that Gupta et al. do not teach or suggest for determining a first alignment approximation based on distances between one or more points in the first image and the second image.

*Examiner's reply: Gupta et al. in col. 4 lines 44-46 clearly teach the alignment approximation based on distances between one or more points. As Gupta et al. in col. 4 lines 44-46 disclose the location of each pixel (i.e. one or more points corresponding to the claim language) in the mask image (i.e. a first image) is transformed by the displacements (i.e. based on distances corresponding to the claim language; Examiner comment: In Newtonian mechanics, **displacement** is one of two subtly different quantities measuring distance) given by interpolation to find the location of its corresponding pixel in the opacified image (i.e. a second image). The intensity of each pixel in the mask image is then log-subtracted from its corresponding pixel in the opacified image.*

Appellant on page 8 third paragraph argues that the Examiner pointed out, the reference Gupta et al. do not teach or suggest aligning the images based on the combination ....

*Examiner's reply: the correct statement is as follows: Gupta et al. do not explicitly specify the language of "a combination of the first and second alignment". Gupta is silent in respect to the claim language that Appellant uses as "a combination ...". However, Gupta in the abstract teaches for obtaining sub-pixel registration of mask and opacified digital X-ray images includes the steps of match point generation, locally-adaptive image-to-image warp generation, and log subtraction, for generating a DSA image. Examiner assumption: Gupta is generating a (digital subtraction anangiography) DSA image by combining the opacified and mask images.*

Art Unit: 2672

Appellant on page 8 in the same paragraph argues that the Examiner does not provide any evidence that the substitution of the Laplacian operation for the purpose of aligning could even function or become operative for the stated purpose.

*Examiner's reply: The Laplacian is a great tool for an image with pixel intensity values, also considers a function  $U(x,y)$  where  $x$ , and  $y$  are spatial variables (have units of length; i.e. distances).*

Appellant on page 9 in the first paragraph argues that Gupta et al. and Frazier et al. do not provide any a reasonable expectation of success for the substitution suggested by examiner.

*Examiner's reply: From pervious arguments, the reference Gupta et al. have shown the limitations of the claim invention. The reference Frazier et al. in figs. 5a-5c illustrate a combination of three images to locate a plate of a vehicle in the figs. 2 and 4.*

Appellant on page 9 in third paragraph argues the Examiner's interpretation of alignment is not equivalent to edge enhancement or shadow reduction.

*Examiner's reply: Appellant on page 7 discloses the definition of the language "aligning" in the claim: Appellant in fig. 3 of the specification illustrates an example flow diagram for image alignment of a current image L1 with a prior image L2. In accordance with one aspect of this invention, a low-resolution image L1 is created for the current image L1, at 310, and distinguishable corners (Examiner's comment: corners are having edges) are identified in this low-resolution current image L1 at 320. A low-resolution image L2 of the prior image L2 will have been created, at 310, and distinguishable corners located, at 320, when the prior image L2 was processed. At 330 the alignment of the images is determined by aligning the distinguishable corners (Examiner's comment: corners are having edges) in the low-resolution images L1 and*

Art Unit: 2672

*L2. Any of a variety of alignment determination schemes may be used, but, because the images are low resolution, this alignment is a coarse alignment, and a simple, low precision; alignment determination process is preferably employed, to facilitate a fast determination of this coarse alignment. Examiner's comment: Coarse alignment is: when images have shifted between exposures and must be realigned before filtering. Appellant does not refer Examiner to any part of the specification for the definition of the "alignment", "aligning", or "aligned".*

Appellant on page 10 argues similar to the previous arguments.

Appellant on page 11 in second paragraph argues the reference Frazier et al. do not teach aligning different images.

*Examiner's reply: Frazier et al. illustrates clearly in figs. 4 the two different images. That means the fig. 4c is the aligned image of the fig. 4b.*

Appellant on page 12 repeated the same argument as Gupta et al. do not disclose determining a second alignment approximation, based on the distance ...

*Examiner's reply: The arguments responded, see previous pages.*

Appellant on page 13 argues that Gupta et al. do not teach implementing RANSAC algorithm.

*Examiner's reply: The step of RANSAC algorithms is well known in the art, (the structure of the RANSAC algorithm is simple but powerful. Repeatedly, subsets are randomly selected from the input data and model parameters fitting the sample are computed. The size of the random samples is the smallest sufficient for determining model parameters.). However Appellant fails to illustrate the calculations, variables and interpretation of data in detail. However, Gupta in col. 2, lines 31-46 teaches similar concept of RANSAC algorithm, by cross-correlating the sample data between images.*



Art Unit: 2672

Appellant on page 14 under claim 5 argues the Gupta et al. do not teach a rotation and component components in the image.

*Examiner's reply: Gupta in cols. 3-4 lines 63-67 and 1-6 teaches the image tiles in the mask and the opacified images may be rotated or translated with respect to each other. The mismatch arising because of such rotation is corrected by a two-dimensional perspective transformation of the mask image tile to the neighborhood of its corresponding tile in the opacified image based, on user-provided rough match points. The method described in Gupta-Srinivas, "Image Warping for Accurate Digital Subtraction Angiography", Proc. of AAAI, Spring Symposium on Applications of Computer Vision in Medical Image Processing, Stanford University, March 21-23, 1994, may be used. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.*

Appellant on pages 15-16 argues Gupta et al. do not teach the limitations in claims 6 and 7.

*Examiner's reply: 3x3 homographic matrix, the method homographic matrix is well known in the art, and the references are using correlation method (matching techniques). Frazier in figs. 5a-c illustrates long horizontal edges are suppressed to reduce false peaks that can occur in portions of the scene (such as in grooves along bumpers) that contain spatial frequencies matching those found in plate characters along the vertical direction (e.g. the vertical spacing of the grooves match the height of the characters) but not along the horizontal direction (i.e. these areas of horizontal grooves contain no vertical lines whose spacing matches the width of the characters). Gupta 121 in col. 4, lines 47-59 teaches that The method, moreover, is not limited to the specific implementation described above. For example, other hierarchical matching techniques, such as those described by Quam, "Hierarchical Warp Stereo", in M. A. Fischler and O. Firschein,*

Art Unit: 2672

*editors, Readings In Computer Vision, pgs. 80-86, Morgan Kaufmann Publishers, Inc., 1987, can be used in match point generation. While a correlation-based matching scheme is described above, a feature-based matching scheme could alternatively be used.*

Appellant on page 16 under claim 8 argues that Gupta et al. do not teach corners in the first and second images based on a determination of Minimum Intensity Changes at the corners,

*Examiner's reply: Gupta in col. 4, lines 41-46 teaches the limitation of claim 8 as the intensity of each pixel in the image. Each pixel in the mask image is then log-subtracted from its corresponding pixel in the opacified image, but does not explicitly specify corners in the first and second images. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.*

Appellant on page 17 regarding claim 9 argues the reference (Gupta et al.) does not teach detecting motion by comparing a set of images.

*Examiner's reply: Gupta et al. in col. 4 lines 13-19 teaches that for a set of points on a square grid in the mask image, the corresponding match points are identified in the opacified image.*

*Due to patient motion, hysteresis, and other such effects, the grid in the opacified image is not square.*

Appellant on pages 18-19 argues as previously discussed.

Appellant on page 19 under claim 10 argues similar to the previous argument as Gupta et al. do not teach or suggest for determining a first alignment approximation based on distances between one or more points in the first image and the second image.

*Examiner's reply: Gupta et al. in col. 4 lines 44-46 clearly teach the alignment approximation based on distances between one or more points. As Gupta et al. in col. 4 lines 44-46 disclose the*

Art Unit: 2672

*location of each pixel (i.e. one or more points corresponding to the claim language) in the mask image (i.e. a first image) is transformed by the displacements (i.e. based on distances corresponding to the claim language; Examiner comment: In Newtonian mechanics, **displacement** is one of two subtly different quantities measuring distance) given by interpolation to find the location of its corresponding pixel in the opacified image (i.e. a second image). The intensity of each pixel in the mask image is then log-subtracted from its corresponding pixel in the opacified image.*

Appellant on pages 20-21 under claim 11 argues that the reference Gupta et al. do not teach the motion of objects in multiple images, either in black and white or color.

*Examiner's reply: Gupta et al. in col. 1 lines 1-2 teach the field of the invention relates to X-ray images, and they are contained colors that are between the low and high resolutions image, the colors can be seen usually in X-ray images are gray, black, and white.*

Appellant on page 21 under claim 12 argues Gupta et al. do not teach determining movement of objects.

*Examiner's reply: Gupta does not explicitly specify a movement of the object, however, it is obvious for a person skill in the art to recognized the X-ray images are taking from a living patient, meaning the objects are related to organs in the patient's body. For example one of the application for X-ray is used in MRI system in the hospital.*

Appellant on page 22 under claim 13 argues similar subject as previously discussed. Gupta et al. and Frazer et al. do not teach detecting motion of objects.

*Examiner's reply: Gupta et al. in col. 1 lines 1-2 teach the field of the invention relates to X-ray images, it is obvious for a person skill in the art to recognized the X-ray images are taking from*

Art Unit: 2672

*a living patient, meaning the objects are related to organs in the patient's body. For example one of the application for X-ray is used in MRI system in the hospital. Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment, and these images are taken from moving vehicles.*

Appellant on page 24 under claim 14 argues similar to the previous argument as Gupta et al. do not teach or suggest for determining a first alignment approximation based on distances between one or more points in the first image and the second image.

*Examiner's reply: Gupta et al. in col. 4 lines 44-46 clearly teach the alignment approximation based on distances between one or more points. As Gupta et al. in col. 4 lines 44-46 disclose the location of each pixel (i.e. one or more points corresponding to the claim language) in the mask image (i.e. a first image) is transformed by the displacements (i.e. based on distances corresponding to the claim language; Examiner comment: In Newtonian mechanics, **displacement** is one of two subtly different quantities measuring distance) given by interpolation to find the location of its corresponding pixel in the opacified image (i.e. a second image). The intensity of each pixel in the mask image is then log-subtracted from its corresponding pixel in the opacified image.*

Appellant on page 24 under claim 16 argues the limitations in the claim 16 are not addressed by the rejection contained in the final office action. The limitations are including a memory for storing a representation of a target image, and wherein the processor is further configured to identify a target within the set of aligned images, based on the representation of the target image.

*Examiner's reply: it is very obvious, because the system must have a memory for storing a representation of a target image. Calculation of X-ray images are usually done less than one*

Art Unit: 2672

*second, and it is impossible for a person to have results in a short time without using a computer that contains processor, memory and computer codes.*

Appellant on page 25 under claim 17 argues similar to the previous argument disagreeing that black, white and gray are not color.

*Examiner's reply: the definition of color is as follows: a visual attribute of things that results from the light they emit or transmit or reflect; "a black and a white colors are made up of many different wavelengths of light".*

Appellant on page 26 under claim 18 argues the reference Frazier et al. do not teach operation on a set of images but teach operations on a single image.

*Examiner's reply: Frazier et al. in figs. 4a, 4b and 4c illustrates clearly three different images (considered as a set of images) from license plate of a moving car.*

Appellant on page 26 under claim 19 argues the Gupta et al. do not teach a rotation component and a translation component in image space.

*Examiner's reply: Gupta in col. 3, lines 63-67, teaches the claim language in the claim 19. The image tiles in the mask and the opacified images may be rotated or translated with respect to each other. The mismatch arising because of such rotation is corrected by a two-dimensional perspective transformation of the mask image tile to the neighborhood of its corresponding tile in the opacified image based, on user-provided rough match points. The method described in Gupta-Srinivas, "Image Warping for Accurate Digital Subtraction Angiography", Proc. of AAAI, Spring Symposium on Applications of Computer Vision in Medical Image Processing, Stanford University, March 21-23, 1994, may be used.*

Art Unit: 2672

Appellant on page 27 under claim 20 argues similar as previous argument. The references do not teach a 3X3 homographic matrix.

*Examiner's reply: 3x3 homographic matrix, the method homographic matrix is well known in the art, and the references are using correlation method (matching techniques). Frazier in figs. 5a-c illustrates long horizontal edges are suppressed to reduce false peaks that can occur in portions of the scene (such as in grooves along bumpers) that contain spatial frequencies matching those found in plate characters along the vertical direction (e.g. the vertical spacing of the grooves match the height of the characters) but not along the horizontal direction (i.e. these areas of horizontal grooves contain no vertical lines whose spacing matches the width of the characters). Gupta 121 in col. 4, lines 47-59 teaches that The method, moreover, is not limited to the specific implementation described above. For example, other hierarchical matching techniques, such as those described by Quam, "Hierarchical Warp Stereo", in M. A. Fischler and O. Firschein, editors, Readings In Computer Vision, pgs. 80-86, Morgan Kaufmann Publishers, Inc., 1987, can be used in match point generation. While a correlation-based matching scheme is described above, a feature-based matching scheme could alternatively be used.*

**(VIII) Claims Appendix**

The copy of the claims contained in the Appendix to the brief is correct.

**(IX) Prior Art of Record**

5848121	Gupta et al.	12-1998
5651075	frazier et al.	07-1997

**(X) Related Proceedings appendix**

None

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-20 rejected under 35 U.S.C. 103(a) as being unpatentable over Gupta et. al. with US patent number 5,848,121 and further in view of Frazier et al. (hereinafter referred as a Frazier).

1. Claim 1.

Gupta in col. 2, lines 23-30 teaches the step of “A method of aligning a first image (as a mask image) to a second image (as a opacified image), comprising:” Gupta in col. 1, lines 58-67 teaches the step of “determining a first alignment approximation, based on distances (see Gupta in col. 4, lines 41-46) between one or more points in the first image and the second image, Gupta in Fig. 2 step 56 illustrates starting with lowest resolution image that teaches the step of “with the first and second images at a first resolution, see Gupta in Fig. 2, steps 58 and 60 that teaches the step of “aligning the second image to the first image, based on the first alignment approximation, to form an initially aligned second image, determining a second alignment approximation, based on distances between one or more points in the first image and the initially aligned second image, Gupta in col. 3, lines 53-62 teaches the step of “with the first and second images at a second resolution different from the first resolution”, See Gupta in Fig. 2 steps 60 and 62 for the following step “aligning the second image to the first image, based on a combination of the first and second alignment approximation”, but Gupta et al. do not explicitly

Art Unit: 2672

specify the language of “a combination of the first and second alignment”. Gupta is silent in respect to the claim language that Appellant uses as “a combination ...”. However, Gupta in the abstract teaches for obtaining sub-pixel registration of mask and opacified digital X-ray images includes the steps of match point generation, locally-adaptive image-to-image warp generation, and log subtraction, for generating a DSA image. Examiner assumption: Gupta is generating a (digital subtraction angiography) DSA image by combining the opacified and mask images. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Examiner’s reply: in view of whole claim 1’s language do not specify clearly the nature of first and second images (static or dynamic or combination), and also do not specify the distinguish between the two images, except the different resolutions.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters ‘B’ and ‘8’).

The advantages of this modification are less cost and save more storage space.

## 2. Claim 2.

Gupta in col. 2, lines 31-46 teaches the step of “The method of claim 1, wherein aligning the second image to the first image based on the combination of the first and second alignment approximations is effected by: aligning the initially aligned second image, which is based on the first alignment approximation, to the first image, based on the second alignment approximation”, but Gupta does not explicitly specify a combination of the first and second



Art Unit: 2672

alignment. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters 'B' and '8').

The advantages of this modification are less cost and save more storage space.

3. Claim 3.

Gupta in Fig. 2 teaches the step of starting with lowest resolution, and this considers as a first resolution. "Determining the first alignment approximation is based on the first resolution being a low-resolution representation of the first and second images, Gupta in Fig. 2 step 58 illustrates that matches interesting points in mask image (first image) with corresponding points in opacified image (second image)," determining the second alignment approximation is based on the second resolution being a higher-resolution representation of the first and second images".

4. Claim 4.

Gupta in col. 2, lines 31-46 teaches the step of "The method of claim 1, wherein determining at least one of the first alignment and second alignment approximations includes applying the RANSAC algorithm", by cross-correlating the sample data between images. The step of RANSAC algorithms is well known in the art, (the structure of the RANSAC algorithm is simple but powerful. Repeatedly, subsets are randomly selected from the input data and model parameters fitting the sample are computed. The size of the random samples is the smallest sufficient for determining model parameters.). However Appellant fails to illustrate the calculations, variables and interpretation of data in detail.

5. Claim 5.

Gupta in col. 3, lines 63-67, teaches the step of "The method of claim 1, wherein determining the first alignment approximation includes an approximation of at least one of a rotation component and a translation component in an image space of the first and second images".

Gupta in cols. 3-4 lines 63-67 and 1-6 teaches the image tiles in the mask and the opacified images may be rotated or translated with respect to each other. The mismatch arising because of such rotation is corrected by a two-dimensional perspective transformation of the mask image tile to the neighborhood of its corresponding tile in the opacified image based, on user-provided rough match points. The method described in Gupta-Srinivas, "Image Warping for Accurate Digital Subtraction Angiography", Proc. of AAAI, Spring Symposium on Applications of Computer Vision in Medical Image Processing, Stanford University, March 21-23, 1994, may be used. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters 'B' and '8').

The advantages of this modification are less cost and save more storage space.

6. Claim 6.

"The method of claim 5, wherein determining the second alignment approximation includes an approximation of components of a 3x3 homographic matrix", the method homographic matrix is well known in the art, and the references are using correlation method (matching techniques).

Frazier in figs. 5a-c illustrates long horizontal edges are suppressed to reduce false peaks that

Art Unit: 2672

can occur in portions of the scene (such as in grooves along bumpers) that contain spatial frequencies matching those found in plate characters along the vertical direction (e.g. the vertical spacing of the grooves match the height of the characters) but not along the horizontal direction (i.e. these areas of horizontal grooves contain no vertical lines whose spacing matches the width of the characters). Gupta 121 in col. 4, lines 47-59 teaches that The method, moreover, is not limited to the specific implementation described above. For example, other hierarchical matching techniques, such as those described by Quam, "Hierarchical Warp Stereo", in M. A. Fischler and O. Firschein, editors, Readings In Computer Vision, pgs. 80-86, Morgan Kaufmann Publishers, Inc., 1987, can be used in match point generation. While a correlation-based matching scheme is described above, a feature-based matching scheme could alternatively be used.

7. Claim 7.

See rejection of claim 6, "The method of claim 1, wherein determining the second alignment approximation includes an approximation of components of a 3x3 homographic matrix".

8. Claim 8.

Gupta in col. 3, lines 44-51 teaches the step of "The method of claim 1, wherein determining at least one of the first and second alignment approximations includes identifying corners in the first and second images based on a determination of Minimum Intensity Changes at the corners", Gupta in col. 4, lines 41-46 teaches the limitation of claim 8 as the intensity of each pixel in the image. Each pixel in the mask image is then log-subtracted from its corresponding pixel in the opacified image, but does not explicitly specify corners in the first and second

Art Unit: 2672

images. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters 'B' and '8').

The advantages of this modification are less cost and save more storage space.

9. Claim 9.

Gupta in col. 2, lines 23-30 teaches the step of "A method of tracking an object based on a first image and a second image, comprising: Gupta in col. 1, lines 58-67 teaches the step of "aligning the first and second images to form a set of aligned images, and detecting motion by comparing the set of aligned images, wherein aligning the first and second images includes: determining a first alignment approximation, based on distances (see Gupta in col. 4, lines 41-46) between one or more points in the first image and the second image, Gupta in Fig. 2 step 56 illustrates starting with lowest resolution image that teaches the step of "with the first and second images at a first resolution, aligning the second image to the first image, based on the first alignment approximation, to form an initially aligned second image, determining a second alignment approximation, based on distances between one or more points in the first image and the initially aligned second image, Gupta in col. 3, lines 53-62 teaches the step of "with the first and second images at a second resolution different from the first resolution, See Gupta in Fig. 2 steps 60 and 62 for the following step "aligning the second image to the first image, based on a combination of the first and second alignment approximations". But Gupta does not explicitly

Art Unit: 2672

specify a combination of the first and second alignment. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters 'B' and '8'). The advantages of this modification are less cost and save more storage space.

10. Claim 10.

Gupta in col. 2, lines 31-46 teaches the step of "The method of claim 9, wherein determining the first alignment approximation is based on a low-resolution representation of the first and second images, and determining the second alignment approximation is based on a higher-resolution representation of the first and second images".

11. Claim 11.

"The method of claim 9, further including identifying the object in the set of aligned images based on color matching", Gupta teaches colors that are between the low and high resolutions image, the colors can be seen usually in X-ray images are gray, black, white.

12. Claim 12.

"The method of claim 9, further including determining a location of the object in each image of the set of aligned images, and determining a movement of the object by comparing the location of the object in each image", Gupta does not explicitly specify a movement of the object, However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Art Unit: 2672

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters 'B' and '8').

The advantages of this modification are less cost and save more storage space.

13. Claim 13.

Gupta in col. 1, lines 31-37 teaches the step of "A motion detecting system comprising: Gupta in col. 2, lines 59-64 teaches the step of "a processor that is configured to: Gupta in col. 1, lines 58-67 teaches the step of "align a first image and a second image, to form a set of aligned images, by: determining a first alignment approximation, based on distances (see Gupta in col. 4, lines 41-46) between one or more points in the first image and the second image, aligning the second image to the first image, based on the first alignment approximation, to form an initially aligned second image, Gupta in Fig. 2 step 56 illustrates "determining a second alignment approximation, based on distances between one or more points in the first image and the initially aligned second image, Gupta in col. 3, lines 53-62 teaches the step of "aligning the second image to the first image, based on a combination of the first and second alignment approximations; See Gupta in Fig. 2 steps 60 and 62 for the following step "compare the set of aligned images to identify motion of objects within the first and second images". But Gupta does not explicitly specify a combination of the first and second alignment. However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by

Art Unit: 2672

helping to distinguish between similar characters (such as between the characters 'B' and '8').

The advantages of this modification are less cost and save more storage space.

14. Claim 14.

Gupta in Fig. 2 step 56 illustrates starting with lowest resolution image that teaches the step of “The motion detecting system of claim 13, wherein the processor is configured to: determine the first alignment approximation by processing a low-resolution representation of at least one of the first and second images, and determine the second alignment approximation by processing a higher-resolution representation of the first and second images”.

15. Claim 15.

Gupta in col. 1, lines 39-48 teaches the step of “The motion detecting system of claim 13, further including at least one camera for producing the first and second images”. Frazier in figs. 4b and 4c illustrates an image of a license plate that produced by a motion detecting system (camera with speed detection).

16. Claim 16.

The step of “The motion detecting system of claim 13, further including a memory for storing a representation of a target image, and wherein the processor is further configured to identify a target within the set of aligned images, based on the representation of the target image”, is obvious, because the system must have a memory for storing a representation of a target image.

17. Claim 17.

“The motion detecting system of claim 16, wherein the representation of the target image is a characterization based on color content of the target image”, Gupta teaches colors that are

Art Unit: 2672

between the low and high resolutions image, the colors than can be seen usually in X-ray images are gray, black, white.

18. Claim 18.

“The motion detecting system of claim 13, further including determining a location of an object in each image of the set of aligned images, and determining a movement of the object by comparing the location of the object in each image”, Gupta does not explicitly specify a movement of the object, However, Frazier et al. in Figs. 4b and 4c illustrates a combination of the first and second alignment applying a Laplacian operator.

Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the teaching of Frazier et al. into Gupta in order to improve performance by helping to distinguish between similar characters (such as between the characters ‘B’ and ‘8’).

The advantages of this modification are less cost and save more storage space.

19. Claim 19.

Gupta in col. 3, lines 63-67, teaches the step of “The motion detecting system of claim 13, wherein determining the first alignment approximation includes an approximation of at least one of a rotation component and a translation component”. The image tiles in the mask and the opacified images may be rotated or translated with respect to each other. The mismatch arising because of such rotation is corrected by a two-dimensional perspective transformation of the mask image tile to the neighborhood of its corresponding tile in the opacified image based, on user-provided rough match points. The method described in Gupta-Srinivas, "Image Warping for Accurate Digital Subtraction Angiography", Proc. of AAAI, Spring Symposium on



Art Unit: 2672

Applications of Computer Vision in Medical Image Processing, Stanford University, March 21-23, 1994, may be used.

20. Claim 20.

"The motion detecting system of claim 19, wherein determining the second alignment approximation includes an approximation of components of a 3x3 homographic matrix", Gupta in col. 4, lines 25-30 teaches a 2x2 matrix. Since the components of a matrix (2x2, 3x3, 4x4,....XxX) are well known in the art, it does not matter as claim language. Appellant fails to represent the data value of a 3x3 matrix.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,


Javid A Amini  
Examiner  
Art Unit 2672

Javid Amini  
March 17, 2005

Conferees

Michael Razavi

Shalwala Bipin



MICHAEL RAZAVI  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 2600

Corporate Patent Counsel  
U.S. Philips Corporation  
580 White Plains Road  
Tarrytown, NY 10591